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## Characteristics of African American Women and their Partners with Perceived Concurrent Partnerships in Four Rural Counties in the Southeastern US

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### Summary

Among African American women from four rural Southeastern counties, partner's concurrency was associated with intimate partner violence, and forced sex, but not economic benefit.

**Background**—To the individual with concurrent partners, it is thought that having concurrent partnerships confers no greater risk of acquiring HIV than having multiple consecutive partnerships. However, an individual whose partner has concurrent partnerships (partner's concurrency) is at increased risk of incident HIV infection. We sought to better understand relationships characterized by partner's concurrency among African American women.

**Methods**—A total of 1,013 African American women participated in a cross-sectional survey from four rural Southeastern counties.

**Results**—Older age at first sex was associated with lower prevalence of partner's concurrency (PR, 95% CI: 0.70, 0.57-0.87), but the participant's age was not associated with partner's concurrency. After adjusting for covariates, ever having experienced intimate partner violence (IPV) or forced sex were most strongly associated with partner's concurrency (PRs, 95% CIs: 1.61, 1.23-2.11; 1.65, 1.20-2.26, respectively). Women in mutually monogamous partnerships were the most likely to receive economic support from their partners; women whose partners had

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concurrent partnerships did not report more economic benefit than those whose partners were monogamous.

**Conclusions**—Associations between history of IPV and forced sex with partner's concurrency suggest that women with these experiences may particularly benefit from interventions to reduce partner's concurrency in addition to support for reducing IPV and other sexual risks. To inform these interventions, further research to understand partnerships characterized by partner's concurrency is warranted.

### Keywords

Sexual partners; sexual behavior; African Americans; women; concurrent partnerships

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### Introduction

Among women diagnosed with HIV/AIDS in 2010 in the United States (US), 64% were African American and most (84%) acquired HIV through heterosexual contact (1). Sexual partnerships form networks through which HIV and other sexually transmitted infections (STIs) spread. The frequency of sexual interactions as well as the sequencing and duration of partnerships influence individual risk of infection and population transmission. Relative to serial sexual partnerships, concurrent sexual partnerships, or partnerships that overlap in time, can accelerate the spread of HIV infection (2). To the individual with concurrent partners, having concurrent partnerships likely confers no greater risk of acquiring an STI than having multiple consecutive partnerships (3, 4). However, an individual whose partner has concurrent partnerships (i.e., partners' concurrency) is at increased risk of incident STI (5, 6), as the partner may be in other sexual networks with higher STI prevalence (7). In a case-control study among African American men and women with heterosexually transmitted HIV infection who lacked traditional high-risk characteristics, partner's concurrency was an independent risk factor for HIV infection (5) suggesting that partner's concurrency has an impact on HIV incidence. A number of studies have evaluated the prevalence and correlates of individuals' participation in concurrency in various populations in the United States (8-10), but partner's concurrency has received considerably less attention (11, 12).

Among African American women at high risk for STI acquisition, participant-reported partner's concurrency has been associated with age, marital status, illicit drug use, and recent STI diagnosis (11); whether these associations are present in a lower-risk, low HIV-prevalence population, is unknown. Qualitative studies among African American adults suggest that while concurrency is normative in some circumstances, many report a committed monogamous relationship as the ideal (13, 14).

We sought to better understand the context and dynamics of relationships characterized by concurrency, with a focus on partner's concurrency, among African American women in the Southeastern US, a region with high rates of HIV and other STIs. Correlates of participant's concurrency are also described to relate this study to existing literature on participant concurrency. We describe the participants' socioeconomic and demographic attributes, sexual and drug use behaviors, as well as interpersonal and sexual characteristics of their

most recent partnership. Previous research demonstrates that economic concerns can motivate initiation and continuation of partnerships (15), and women report preference for monogamy (13, 14). Therefore, we hypothesized that compared with participants whose partners were monogamous, those whose partners had concurrent relationships would receive some additional benefit (e.g., economic support, gifts, housing) as a motivating factor for remaining in the relationship.

## Materials and Methods

### Participants and Procedure

Data were drawn from a cross-sectional study that included 1,013 African American women from two rural counties in northeastern Alabama and two contiguous rural counties in eastern North Carolina. Recruitment and data collection procedures have been previously described (16). In brief, women were recruited between October 2008 and September 2009 using multiple methods, including venue-based recruitment (e.g., beauty salons, laundromats, shopping centers, churches, local community organizations, educational and training facilities, health clinics), advertisements in locally posted flyers, participant-referral with incentives, and word-of-mouth referral without incentives. Eligibility criteria included: 1) self-identification as African American; 2) 18-59 years of age (19-59 in Alabama, where participants were required to be 19 or older to give legal consent for study participation), 3) report of vaginal or anal intercourse with a man in the past 12 months, 4) not previously diagnosed as HIV-infected, 5) willing to be tested for HIV using rapid oral testing, 6) willing and able to give informed consent, and 7) able to understand English. Women provided written informed consent prior to completing an audio computer-assisted self-interview (ACASI) and undergoing rapid HIV testing that included pre- and post-test counseling.

Review and approval of the study protocol was received from local Institutional Review Boards (IRBs), the U.S. Centers for Disease Control and Prevention IRB, and the U.S. Office of Management and Budget (control number 0920-0760).

### Concurrency Measures

Regarding their three most recent sex partners in the last 12 months, participants were asked “As far as you know, during the time you were having sexual relations with partner number x (i.e., 1, 2, or 3), did he have sex with other men or women?” Available responses were: “definitely did not;” “probably did not;” “probably did;” and “definitely did” have sex with other people. Perceived partner’s concurrency was defined as a report that at least one of their sex partners in the past 12 months “definitely did” have sex with others during their relationship. We also performed a sensitivity analysis in which we relaxed the definition of partner’s concurrency to include those who “probably did” have other partners.

Participants were also asked to provide the estimated month and year of first and last sexual encounters for their most recent sex partners in the past 12 months (for a maximum of three partners). If the month of first sexual encounter with one partner occurred before the month of last sexual encounter with an earlier partner for at least one of their most recent partners,

we considered the participant to have had concurrent partners (i.e., if one partnership ended and another partnership started that same month, they were not considered concurrent).

Relationships were categorized into the following groups: participant's concurrency only, partner's concurrency only, both the participant and their partner with concurrent relationships, and neither the participant nor their partner with concurrent relationships (i.e., mutual monogamy).

### Covariates

Participants reported their age, highest level of education, household income, and concern over the past 30 days about getting enough food for their family. Participants reported on use of illicit drugs (injection and non-injection): crack/cocaine, heroin, methamphetamines or “speed,” club drugs, narcotics, or “downers” in the past 12 months. Frequency of binge alcohol consumption (i.e., >4 drinks in a day) was assessed for the past 30 days. For sexual history, participants reported age at first sex, number of lifetime sex partners, number of sex partners in the past 12 months, frequency of vaginal and anal sex and use of condoms in the past 12 months. The questionnaire asked if anyone had ever physically forced participants to have sexual contact when they didn't want to (i.e., forced sexual contact) and if anyone they had sex with had physically hurt or threatened to hurt them, ever or in the past 12 months (i.e., intimate partner violence or IPV).

Participants reported characteristics of the partnerships, including frequency of vaginal and anal sex, condom use, and whether they received items like money, clothes, and gifts from their partner(s). We report these characteristics for the participant's most recent partnership according to the dates provided for sexual contact.

### Statistical Analysis

We fit log binomial models to calculate prevalence ratios (PRs) and 95% confidence limits (17). To assess the differences in items received by concurrency type (i.e., participant only, partner only, both, or neither in concurrent partnerships), we used Chi-square tests. Observations with missing exposure, outcome, or covariates (if applicable) were excluded; missing totals for each variable, all of which were less than 10%, are reported in the footnotes of Tables 1 and 4. Potential confounders included age (modeled using a restricted quadratic spline (18) with knots at ages 23, 29, 37, and 45 years), education, age at first sex (modeled using a restricted quadratic spline with knots at ages 14, 15, 16, and 17 years), marital status (categorized as single/separated/widowed/divorced; married/living together as married), income, food insecurity, binge alcohol consumption, IPV, and ever having forced sexual contact. As there were so few participants who used illicit drugs, we did not adjust for this factor. In adjusted analyses, we adjusted for all other factors except covariates (or mediators) likely to be affected by the primary exposures as this results in over adjustment (19). For education and marital status models, we did not adjust for income (20) or food insecurity (21). For income models, we did not adjust for food insecurity (21). All analyses were conducted using SAS 9.3 (SAS Institute, Cary, North Carolina).

## Results

The 1,013 participants enrolled in this study were evenly distributed between the two sites (Table 1). The overall median age was 33 (interquartile range (IQR): 24, 42), and most of the participants (55.7%) were single, never married. Half of participants (n=495) reported a household income of \$12,000 per year. The proportion of participants who used illicit drugs was 7.0%, and 20.4% of the participants had more than 4 drinks in a day at least once during the past 30 days. As has been previously reported (16), only 1 participant at the Alabama site tested positive for HIV and 19% of women were diagnosed with gonorrhea, chlamydia, syphilis, trichomonas, genital HPV, bacterial vaginosis, or pelvic inflammatory disease in the past 12 months

The median age of first sex was 16 years. Similar proportions reported ever having experienced IPV, and ever having had forced sexual contact (22.9%, and 23.5%, respectively). Sixty-four percent (n=649) reported only one sex partner in the past 12 months, and of these, 566 did not report that their partner “definitely did” have other partners.

### Participant's concurrency

Of the 1,013 women, 24% of participants (n=244) had concurrent partnerships according to the dates provided for their three most recent partnerships. Crude prevalence ratios (PR) of participants' concurrency by demographic factors are reported in Table 2. Each five-year age increase was associated with a 12% decrease in prevalence of the participants' concurrency. Married participants reported a lower prevalence of their own concurrency (PR, 95% CI: 0.34, 0.23- 0.49) compared with other participants. Increased prevalence of participant's concurrency was observed among illicit drug users (PR, 95% CI: 1.87, 1.34-2.60), binge alcohol consumers (1.32, 1.04-1.68) and those who had experienced IPV ever (1.76, 1.42-2.20) or in the past 12 months (1.14, 1.08-1.20), and ever experienced forced sexual contact (1.14, 1.08-1.20). Per five-year decrease, age at first sex was associated with a 33% increase in participants' concurrency.

Results from adjusted analyses are presented in Table 3. Ever having experienced IPV was associated with participant's concurrency (PR, 95% CI: 1.61, 1.23-2.11) after adjustment for covariates.

### Partner's Concurrency

A total of 204 participants (20%) reported that their partner “definitely did” have other partners. Married participants reported a lower prevalence of partner's concurrency (PR, 95% CI: 0.74, 0.54-1.00) (Table 2). Less than a high school education (PR, 95% CIs: 1.34, 1.01-1.79), food insecurity (1.52, 1.19-1.95), and ever having been exposed to IPV (2.24, 1.75-2.79), IPV in the past 12 months (1.20, 1.14-1.27), or ever having forced sexual contact (2.21, 1.75-2.79) were crudely associated with increased prevalence of partners' concurrency. Per five-year decrease, age at first sex was associated with a 30% increase in partners' concurrency.

Results from adjusted analyses are presented in Table 3. Ever having experienced IPV (PR, 95% CI: 1.65, 1.20-2.26) and forced sexual contact were associated with partner's concurrency (1.62, 1.18-2.24) after adjustment for covariates.

When expanding the definition of partner's concurrency to include women who reported their partner “probably did” have sex with others during their sexual relationship (data not shown), the proportion of women reporting that neither they nor their most recent partner had concurrent partnerships (i.e., mutual monogamy) decreased from 65% to 48.0%. Under this sensitivity analysis, associations with partner's concurrency shown in Tables 2 and 3 were in the same direction, but generally attenuated.

### Characteristics of Most Recent Partnership

Half of participants who were in a partnership in which neither partner was involved in concurrency reported never using condoms with their most recent partner; similarly, 51% of participants who were in a partnership in which their only partner was involved in concurrency reported never using condoms (Table 4).

Participants in mutually monogamous partnerships were more likely than those in other relationship categories to report material support from their partner (i.e., money, place to live, food/things for the house, clothing/gifts, and help with bills). Participants who reported that only their partner was involved in concurrency were more likely to receive a place to live from their partner, compared with participants who had concurrent relationships (23% versus 12%, respectively,  $p<0.01$ ). However, this group also was the most likely to have reported getting “nothing” from their partner (27%,  $p<0.01$ ). Participants in a partnership in which both individuals were involved in concurrency were least likely to report receiving money, food/things for the house, clothing/gifts, and help with bills. Receipt of drugs was uncommon across all groups, making the chi-square statistic for this outcome unreliable.

### Discussion

In this cross-sectional sample of predominantly lower income African American women recruited from four rural counties in the Southeastern US 20% reported that at least one male partner in the past 12 months had concurrent partnerships during the course of their relationship. However, most of the women (64%) had mutually monogamous partnerships over the past 12 months.

Marital status, education, food insecurity, illicit drug use, binge alcohol consumption, earlier age at first sex, intimate partner violence, and history of forced sexual contact were all associated with partner's concurrency in crude analyses. Analyses from Cycle 6 of the National Survey of Family Growth showed that 19% of African-American women had non-monogamous partners (collected as yes/no) and marital status was strongly associated with partner's concurrency (22). Among women enrolled in the HIV Prevention and Treatment Network (HPTN) 064 trial (11), where the proportion of women with partner's concurrency was higher (36% in the past 6 months), being unmarried and increased illicit drug use were associated with higher risk of partner's concurrency. However, in addition to at least one unprotected act of sex with a man in the past six months, inclusion criteria for the HPTN

trial included at least one of the following: illicit drug use, alcohol dependence, binge-drinking, incarceration, self-reported history of STIs, exchange of sex for commodities, or reported male sexual partner with any of these risk characteristics. Women were recruited from specific United States' census tracts with high prevalence of poverty and HIV. As such, results from this high risk group may not generalize to a broader population of African American women.

In our study, past IPV and forced sexual contact were crudely associated with participant's and their partner's concurrency (PRs, 95% CIs: 1.61, 1.23-2.11; 1.65, 1.20-2.26, respectively). Forced sexual contact remained associated with partners' concurrency, but not with participants' concurrency after adjustment for confounders. Both of these forms of violence have been associated with other STI acquisition risk factors. Past IPV has been associated with more sexual partners (23), history of STIs (23), low/no condom use (23), and partners with known HIV risk factors (23). History of forced sexual contact has been found to be associated with more sexual partners (24) and past STIs (24, 25). Though we cannot assume a causal relationship between IPV and forced sexual contact with concurrency, it is clear that they have serious, long-term psychological consequences (26).

In a national phone survey in the US, one-third of all women reported that financial concerns motivated longer relationships than they desired, and a quarter of women had initiated a relationship because of financial concerns (15). African American women, probably because of their greater economic hardship, were more likely than White women to report financial motivation for starting a relationship. While economic considerations may have also motivated women in our study to start or remain in relationships characterized by partner's concurrency, they were less likely to report actually having received material goods than those in mutually monogamous relationships. This may have been due, at least in part, to poverty among the respondents' partners as well as the respondents themselves.

Despite the increased risk of acquiring STIs from partner's concurrency, the proportion of women who did not use condoms in these partnerships was similar to the condom use frequency in monogamous partnerships. This may be due to general dislike of condoms as well as the perception that the individual who proposes condom use within a partnership will be perceived as the unfaithful one (13).

This study has several limitations. First, this study's population is not a random sample of a defined population. The median yearly household income among African Americans in the four counties in which participants resided was between \$22,000 and \$35,000 according to the 2007-2009 three-year American Community Survey estimates (27), but half of the population in this study reported an annual family income of less than \$12,000. Second, the cross-sectional design makes it difficult to assess the time order of exposures, covariates, and outcomes. In particular, it is difficult to ensure that outcomes succeed the exposures and that covariates are not on the causal path between an exposure and outcome, as the timing of the covariate is unclear. We minimized this problem by excluding covariates that are conceptually on the causal path. Third, participant reports of (likely) unobserved partner behaviors may be prone to error; some studies have noted poor agreement between individuals' reports of their partners' concurrency and the partners' reports of their own



concurrent partnerships (28). This lack of agreement stems largely from participants' failure to identify their partners' participation in concurrent partnerships, as opposed to participants' identification of partner's concurrency when it was not present (6). Finally, participants only reported information about their three most recent sexual partners, which may have underestimated both the participant's concurrency and whether their partners had other partners. As only 73 participants had more than 3 partners, this measurement error is likely negligible.

This study has a number of strengths. First, all participants were African American women from the Southeastern US who were sexually active, a high priority population. Given persistent high endemic STI prevalence in the South, these women are especially at risk for sexually transmitted infections from their partner's concurrency. Second, the use of ACASI ensured consistent administration of the questionnaire across all participants and may have elicited fewer inhibitions in answering sensitive questions (29). Third, unlike prior research that was limited to high-risk populations (e.g., HPTN 064 (11) and STD clinics (30)), our sample represents a group at lower risk for HIV infection (22). This is reflected in the prevalence of HIV; HIV prevalence at study entry in HPTN 064 was 1.5% and in this study was 0.1%. Fourth, there was minimal missing data.

To make sexual relationships lower risk and to lower the rate of incident HIV infection for African American women in the Southeastern United States, educational interventions to decrease participation in concurrent partnerships have been implemented. Wingood et al. report that their randomized HIV education intervention among African American women significantly reduced their participation in concurrent relationships (31). However, interventions targeted to reduce HIV incidence among African American women will also have to reduce partner's concurrency. To inform these interventions' messages and strategies, studies that characterize relationships where the partner has concurrent relationships are important. The associations observed between IPV and forced sexual contact with partner's concurrency suggest that populations with these experiences may benefit from interventions targeted at partner's concurrency. Moreover, future STI reduction interventions may benefit from evaluating the effect of these interventions on partner's concurrency. All couple- and individual-level HIV and STI interventions stress the importance of monogamy; however, to our knowledge, there are no intervention approaches that reduce the likelihood of partner's concurrency. Sexual relationships and networks are the consequence of myriad factors, including economic, social, and structural forces; this study shows the need for better understanding of the factors that motivate relationships and network patterns that promote HIV transmission.

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The findings and conclusions in this report are those of the author and do not necessarily represent the views of the Centers for Disease Control and Prevention.



## References

1. Centers for Disease Control and Prevention. Estimated HIV incidence in the United States, 2007-2010. HIV Surveillance Supplemental Report. 2012; 17(4)
2. Watts CH, May RM. The influence of concurrent partnerships on the dynamics of HIV/AIDS. *Math Biosci.* 1992; 108(1):89–104. [PubMed: 1551000]
3. Mercer CH, Aicken CRH, Tanton C, et al. Serial monogamy and biologic concurrency: measurement of the gaps between sexual partners to inform targeted strategies. *Am J Epidemiol.* 2013; 178(2):249–59. [PubMed: 23801013]
4. Padian NS, Manian S. The concurrency debate: time to put it to rest. *Lancet.* 2011; 378(9787):203–4. [PubMed: 21763921]
5. Adimora AA, Schoenbach VJ, Martinson FE, et al. Heterosexually transmitted HIV infection among African Americans in North Carolina. *J Acquir Immune Defic Syndr.* 2006; 41(5):616–23. [PubMed: 16652036]
6. Drumright LN, Gorbach PM, Holmes KK. Do people really know their sex partners? Concurrency, knowledge of partner behavior, and sexually transmitted infections within partnerships. *Sex Transm Dis.* 2004; 31(7):437–42. [PubMed: 15215701]
7. Gorbach PM, Drumright LN, Holmes KK. Discord, discordance, and concurrency: comparing individual and partnership-level analyses of new partnerships of young adults at risk of sexually transmitted infections. *Sex Transm Dis.* 2005; 32(1):7–12. [PubMed: 15614115]
8. Adimora AA, Schoenbach VJ, Bonas DM, Martinson FE, Donaldson KH, Stancil TR. Concurrent sexual partnerships among women in the United States. *Epidemiology.* 2002; 13(3):320–7. [PubMed: 11964934]
9. Adimora AA, Schoenbach VJ, Taylor EM, Khan MR, Schwartz RJ. Concurrent partnerships, nonmonogamous partners, and substance use among women in the United States. *Am J Public Health.* 2011; 101(1):128–36. [PubMed: 20724694]
10. Senn TE, Carey MP, Vanable PA, Coury-Doniger P, Urban M. Sexual partner concurrency among STI clinic patients with a steady partner: correlates and associations with condom use. *Sex Transm Infect.* 2009; 85(5):343–7. [PubMed: 19204019]
11. Adimora AA, Hughes JP, Wang J, et al. Characteristics of multiple and concurrent partnerships among women at high risk for HIV infection. *J Acquir Immune Defic Syndr.* 2014; 65(1):99–106. [PubMed: 24056163]
12. Brown JL, Sales JM, Diclemente RJ, Latham Davis TP, Rose ES. Characteristics of African American adolescent females who perceive their current boyfriends have concurrent sexual partners. *J Adolesc Health.* 2012; 50(4):377–82. [PubMed: 22443842]
13. Frye V, Williams K, Bond KT, et al. Condom use and concurrent partnering among heterosexually active, African American men: a qualitative report. *J Urban Health.* 2013; 90(5):953–69. [PubMed: 22869516]
14. Senn TE, Scott-Sheldon LA, Seward DX, Wright EM, Carey MP. Sexual partner concurrency of urban male and female STD clinic patients: a qualitative study. *Arch Sex Behav.* 2011; 40(4):775–84. [PubMed: 21052812]
15. Dunkle KL, Wingood GM, Camp CM, DiClemente RJ. Economically motivated relationships and transactional sex among unmarried African American and white women: results from a U.S. national telephone survey. *Public Health Reports.* 2010; 125(Suppl 4):90–100. [PubMed: 20626196]
16. McLellan-Lemal E, O'Daniels CM, Marks G, et al. Sexual risk behaviors among African-American and Hispanic women in five counties in the southeastern United States: 2008-2009. *Womens Health Issues.* 2012; 22(1):e9–18. [PubMed: 21784659]
17. Lee J. Odds ratio or relative risk for cross-sectional data? *Int J Epidemiol.* 1994; 23(1):201–3. [PubMed: 8194918]
18. Howe CJ, Cole SR, Westreich DJ, Greenland S, Napravnik S, Eron JJ Jr. Splines for trend analysis and continuous confounder control. *Epidemiology.* 2011; 22(6):874–5. [PubMed: 21968779]
19. Schisterman EF, Cole SR, Platt RW. Overadjustment bias and unnecessary adjustment in epidemiologic studies. *Epidemiology.* 2009; 20(4):488–95. [PubMed: 19525685]

20. Hahn BA. Marital status and women's health: The effect of economic marital acquisitions. *J Marriage and Fam.* 1993; 55:495–504.
21. Rose D. Economic determinants and dietary consequences of food insecurity in the United States. *J Nutr.* 1999; 129(2S Suppl):517S–20S. [PubMed: 10064321]
22. Aral SO, Leichliter JS. Non-monogamy: risk factor for STI transmission and acquisition and determinant of STI spread in populations. *Sex Transm Infect.* 2010; 86(Suppl 3):iii29–36. [PubMed: 20924047]
23. Wu E, El-Bassel N, Witte SS, Gilbert L, Chang M. Intimate partner violence and HIV risk among urban minority women in primary health care settings. *AIDS Behav.* 2003; 7(3):291–301. [PubMed: 14586191]
24. Upchurch DM, Kusunoki Y. Associations between forced sex, sexual and protective practices, and sexually transmitted diseases among a national sample of adolescent girls. *Women's Health Issues.* 2004; 14(3):75–84. [PubMed: 15193635]
25. Ohene SA, Halcon L, Ireland M, Carr P, McNeely CD. Sexual abuse history, risk behavior, and sexually transmitted diseases: the impact of age at abuse. *Sex Transm Dis.* 2005; 32(6):358–63. [PubMed: 15912082]
26. Jordan CE, Campbell R, Follingstad D. Violence and women's mental health: the impact of physical, sexual, and psychological aggression. *Annu Rev Clin Psychol.* 2010; 6:607–28. [PubMed: 20192793]
27. US Bureau of the Census. Pages. Accessed at [http://www.socialexplorer.com/tables/ACS2009\\_3yr/R10759539](http://www.socialexplorer.com/tables/ACS2009_3yr/R10759539)
28. Stoner BP, Whittington WL, Aral SO, Hughes JP, Handsfield HH, Holmes KK. Avoiding risky sex partners: perception of partners' risks v partners' self reported risks. *Sex Transm Infect.* 2003; 79(3):197–201. [PubMed: 12794201]
29. Gorbach PM, Mensch BS, Husnik M, et al. Effect of computer-assisted interviewing on self-reported sexual behavior data in a microbicide clinical trial. *AIDS Behav.* 2013; 17(2):790–800. [PubMed: 23054034]
30. Nunn A, Maccarthy S, Barnett N, et al. Prevalence and predictors of concurrent sexual partnerships in a predominantly African American population in Jackson, Mississippi. *AIDS Behav.* 2014
31. Wingood GM, Robinson LR, Braxton ND, et al. Comparative effectiveness of a faith-based HIV intervention for African American women: importance of enhancing religious social capital. *Am J Public Health.* 2013; 103(12):2226–33. [PubMed: 24134367]

**Table 1**  
**Participant characteristics among African American women from four rural counties in the Southeastern US, 2008-2009**

Characteristic <sup>a</sup>	Alabama site (n=512)		North Carolina site (n=501)		Total (n=1,013)	
	n	%	n	%	n	%
Age (median (IQR))	30 (23, 42)		35 (26, 43)		33 (24, 42)	
Marital status						
Single, never married	285	55.7	279	54.7	564	55.7
Married	109	21.3	101	19.8	210	20.7
Living together as married	33	6.4	16	3.1	49	4.8
Separated/divorced/widowed	83	16.2	105	20.6	188	18.6
Education level						
Less than high school	83	16.2	81	15.9	164	16.2
Income, food security						
Household income 12k/year	275	53.7	220	43.1	495	48.9
Worried about enough food for you or your family?	121	23.6	131	25.7	252	24.9
Alcohol and drug use						
Use of illicit drugs <sup>b</sup> in past 12 months	33	6.4	38	7.5	71	7.0
Binge alcohol consumption <sup>c</sup>	113	22.1	94	18.4	207	20.4
Sexual characteristics						
Age at first sex (median, IQR)	16 (14, 17)		16 (14, 17)		16 (14, 17)	
Intimate partner violence ever	117	22.9	115	22.5	232	22.9
Intimate partner violence past 12 months	25	4.9	23	4.5	48	4.7
Ever had forced sexual contact	111	21.7	127	24.9	238	23.5
No. of lifetime sex partners (median, IQR)	7 (5, 12)		8 (5, 15)		8 (5, 15)	
No. of sex partners in past 12 months (median, IQR)	1 (1, 2)		1 (1, 2)		1 (1, 2)	
Participants' concurrency <sup>d</sup> only	68	13.3	70	13.7	138	13.6
Partners' concurrency <sup>e</sup> only	50	9.8	48	9.4	98	9.7
Both participants' and partners' concurrency	64	12.5	42	8.2	106	10.5
Neither participants' or partners' concurrency	304	59.4	323	63.3	627	61.9

*Note.* Sample sizes fluctuate slightly for some variables due to missing data. Some percentages do not sum to 100 due to rounding.

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<sup>b</sup>The following data were missing (Alabama site, North Carolina site, Total): age (0, 0, 0), marital status (2, 0, 2), education level (1, 0, 1), household income (19, 7, 26), food insecurity (0, 0, 0), drug use (0, 0, 0), binge alcohol consumption (2, 0, 2), age at first sex (12, 5, 17), intimate partner violence ever (7, 0, 7), intimate partner violence in past 12 months (3, 0, 3), ever been pressured into sex (6, 0, 6), ever had forced sexual contact (7, 0, 7), number of lifetime sex partners (9, 4, 13), number of sex partners in past 12 months (2, 1, 3), concurrency (26, 18, 44)

<sup>c</sup>Excluding marijuana

<sup>d</sup>>4 drinks in one day during the last 30 days

<sup>e</sup>Participant's concurrency defined as an overlap of >1 month in dates of three most recent sexual partnerships

<sup>f</sup>Partner's concurrency defined as participant's report of partner "definitely" having had concurrent partner(s) during their sexual partnership

**Table 2**  
**Unadjusted Prevalence Ratios (PR) for Participants' and Partners' Concurrency, among African American women from four rural counties in the Southeastern US, 2008-2009**

	Participants' Concurrency <sup>d</sup>		Partners' Concurrency <sup>e</sup>	
	PR	95% CI	PR	95% CI
Age (per 5 year increase)	0.88	0.83, 0.93	1.00	0.94, 1.05
Marital status <sup>a</sup>				
Single	1.		1.	
Married/living together	0.34	0.23, 0.49	0.74	0.54, 1.00
Education level				
Less than high school	1.21	0.92, 1.59	1.34	1.01, 1.79
Income, food security				
Household income 12k/year	1.38	1.11, 1.73	1.18	0.92, 1.51
Worried about enough food for you or your family?	1.25	0.99, 1.58	1.52	1.19, 1.95
Alcohol and drug use				
Use of illicit drugs <sup>b</sup> in past 12 months	1.87	1.38, 2.52	1.87	1.34, 2.60
Binge alcohol consumption <sup>c</sup>	1.32	1.04, 1.68	1.31	0.97, 1.77
Sexual behavior				
Age at first sex (per 5 year increase)	0.67	0.56, 0.82	0.70	0.57, 0.87
Intimate partner violence, ever	1.76	1.42, 2.20	2.24	1.78, 2.83
Intimate partner violence, in past 12 months	1.14	1.08, 1.20	1.20	1.14, 1.27
Forced sexual contact, ever	1.39	1.11, 1.76	2.21	1.75, 2.79

<sup>a</sup>Single included those who were separated, widowed, and divorced. Married included those who were living as married.

<sup>b</sup>Excluding marijuana

<sup>c</sup>>4 drinks in one day during the last 30 days

<sup>d</sup>Participant's concurrency defined as an overlap of >1 month in dates of three most recent sexual partnerships

<sup>e</sup>Partner's concurrency defined as participant's report of partner in the past 12 months "definitely" having had concurrent partner(s) during their sexual partnership

**Table 3**  
**Adjusted<sup>a</sup> Prevalence Ratios (PR) for Participants' and Partners' Concurrency, among African American women from four rural counties in the Southeastern US, 2008-2009**

	Participants' Concurrency <sup>d</sup>		Partners' Concurrency <sup>e</sup>	
	PR	95% CI	PR	95% CI
Marital status				
Single	1.		1.	
Married/living together	0.56	0.40, 0.83	0.84	0.55, 1.27
Education level				
Less than high school	1.15	0.87, 1.52	1.30	0.94, 1.78
Income, food security				
Household income 12k/year	0.99	0.80, 1.24	0.97	0.75, 1.26
Worried about enough food for you or your family?	0.98	0.75, 1.29	1.12	0.81, 1.55
Alcohol and drug use				
Use of illicit drugs <sup>b</sup> in past 12 months	1.17	0.85, 1.60	1.23	0.74, 2.05
Binge alcohol consumption <sup>c</sup>	1.22	0.99, 1.50	1.17	0.86, 1.59
History of violence				
Age at first sex (per 5 year inc)	0.82	0.62, 1.07	0.94	0.72, 1.23
Intimate partner violence, ever	1.61	1.23, 2.11	1.65	1.20, 2.26
Forced sexual contact, ever	1.05	0.79, 1.39	1.62	1.18, 2.24

<sup>a</sup> All models were adjusted for age and all other covariates, except: no models were adjusted for drug use; the model for marital status was not adjusted for income or food insecurity; the model for education was not adjusted for income or food insecurity; the model for income was not adjusted for food insecurity.

<sup>b</sup> Excluding marijuana

<sup>c</sup> >4 drinks in one day during the last 30 days

<sup>d</sup> Participant's concurrency defined as an overlap of >1 month in dates of three most recent sexual partnerships

<sup>e</sup> Partner's concurrency defined as participant's report of partner in the past 12 months "definitely" having had concurrent partner(s) during their sexual partnership

Table 4

**Characteristics <sup>a</sup> of most recent sexual partnership (during the past 12 months) of African American women from four rural counties in the Southeastern US, 2008-2009**

	Participants' concurrency <sup>c</sup> only (n=138)		Partners' concurrency <sup>d</sup> only (n=98)		Both (n=106)		Neither (n=627)		Chi-square test
	n	%	n	%	n	%	n	%	
Frequency of vaginal sex?									
4 times/month	69	63.4	56	60.2	41	55.4	361	60.7	0.72
More than 4 times/month	39	36.1	37	39.8	33	44.6	234	39.3	
Condom use during vaginal sex?									
Never	50	46.3	50	53.8	41	55.4	354	59.8	0.06
Ever	58	53.7	43	46.2	33	44.6	238	40.2	
Frequency of anal sex?									
Not at all	80	74.1	65	70.1	56	76.7	478	81.0	0.07
Ever	28	25.9	27	29.4	17	23.3	112	19.0	
Condom use during anal sex?									
Never	17	60.1	18	64.3	15	83.3	86	74.1	0.27
Ever	11	39.3	10	35.7	3	16.7	30	25.9	
Partner has given to you or your family?									
Money	78	72.9	58	62.4	50	67.6	472	79.7	0.0006
Place to live	13	12.2	21	22.6	10	13.5	179	30.2	<0.0001
Food/things for house	63	58.9	50	53.8	35	47.3	355	60.0	0.16
Clothing/gifts	59	55.1	42	45.2	35	47.3	366	61.8	0.003
Paid bills	45	42.1	33	35.5	23	31.1	303	51.2	0.0005
Drugs	2	1.9	4	4.3	2	2.7	6	1.0	<i>b</i>
Nothing	17	15.9	25	26.9	18	24.3	63	10.6	<0.0001

<sup>a</sup>The following data were missing: concurrency (44), frequency of vaginal sex (99), condom use during vaginal sex (102), frequency of anal sex (106), condom use during anal sex (132), received items (103).

<sup>b</sup>Model numbers too small for chi-square test

<sup>c</sup>Participant's concurrency defined as an overlap of >1 month in dates of three most recent sexual partnerships

<sup>d</sup>Partner's concurrency defined as participant's report of partner in the past 12 months "definitely" having had concurrent partner(s) during their sexual partnership